

Washing Machine Provided With Electrical Heating Element

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Abstract of GB2080343

A washing machine has at least one electrical heating element 5 mounted in a housing 4 in the lower part 3 of the tub of the machine. The element 5 passes through a front seal bearing against a corresponding peripheral edge of the orifice of the housing 4 and clamped against the edge by means of an external flange member 26. The front seal 21 is of a shape which is tapered inwardly of the tub and said edge 7 is correspondingly flared outwardly of the tub. The flange member 26 is fixed by means of at least two self-tapping or self-threading screws 31, 32. A resilient plate member 13 made of a corrosion-resistant material holds the element spaced from the floor of the housing.

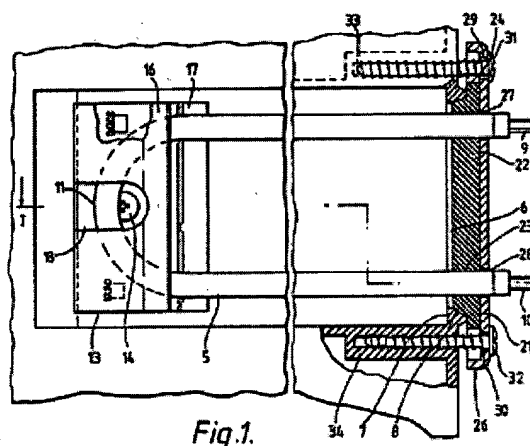


Fig. 1.

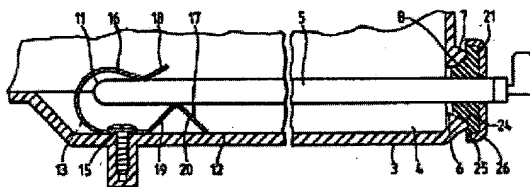


Fig. 2.

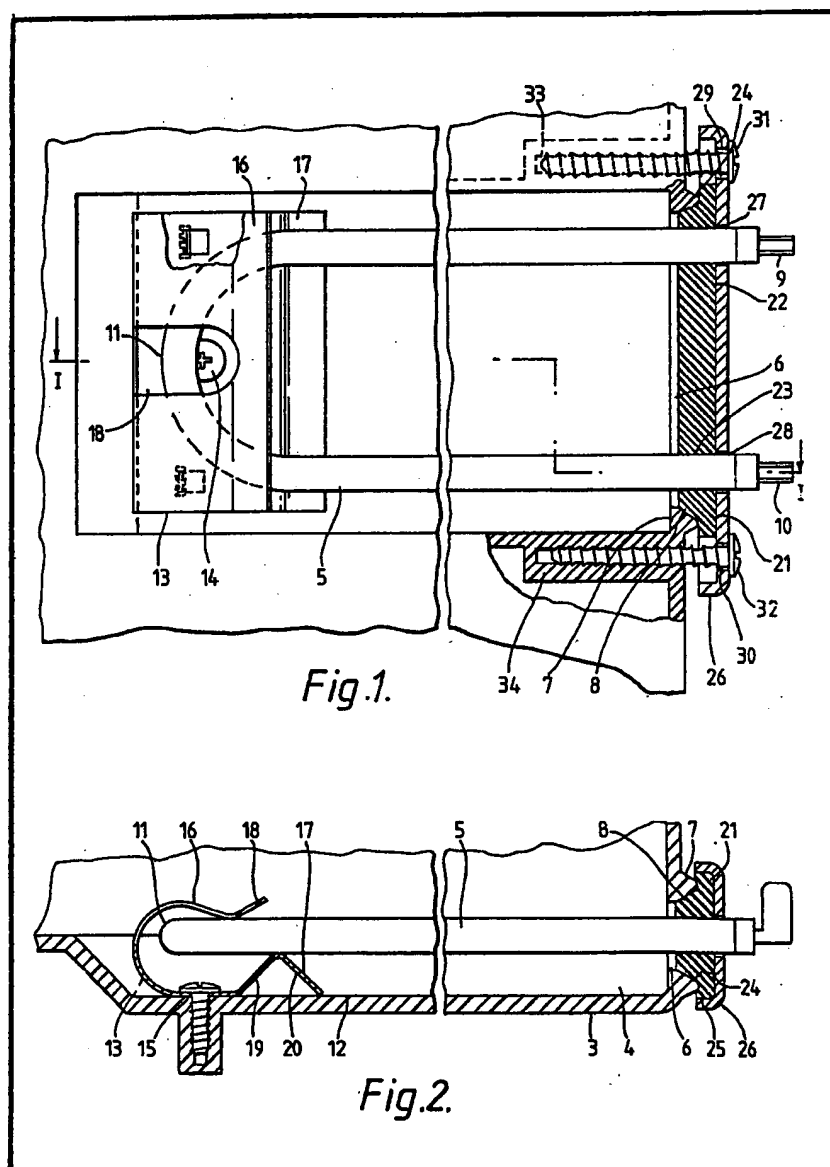
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(54) Washing Machine Provided With Electrical Heating Element

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edge by means of an external flange member 26. The front seal 21 is of a shape which is tapered inwardly of the tub and said edge 7 is correspondingly flared outwardly of the tub. The flange member 26 is fixed by means of at least two self-tapping or self-threading screws 31, 32. A resilient plate member 13 made of a corrosion-resistant material holds the element spaced from the floor of the housing.



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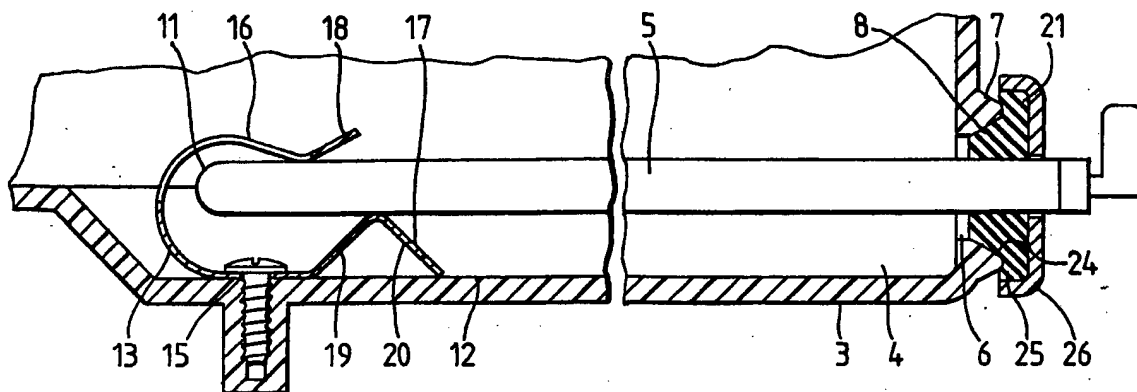


Fig. 2.

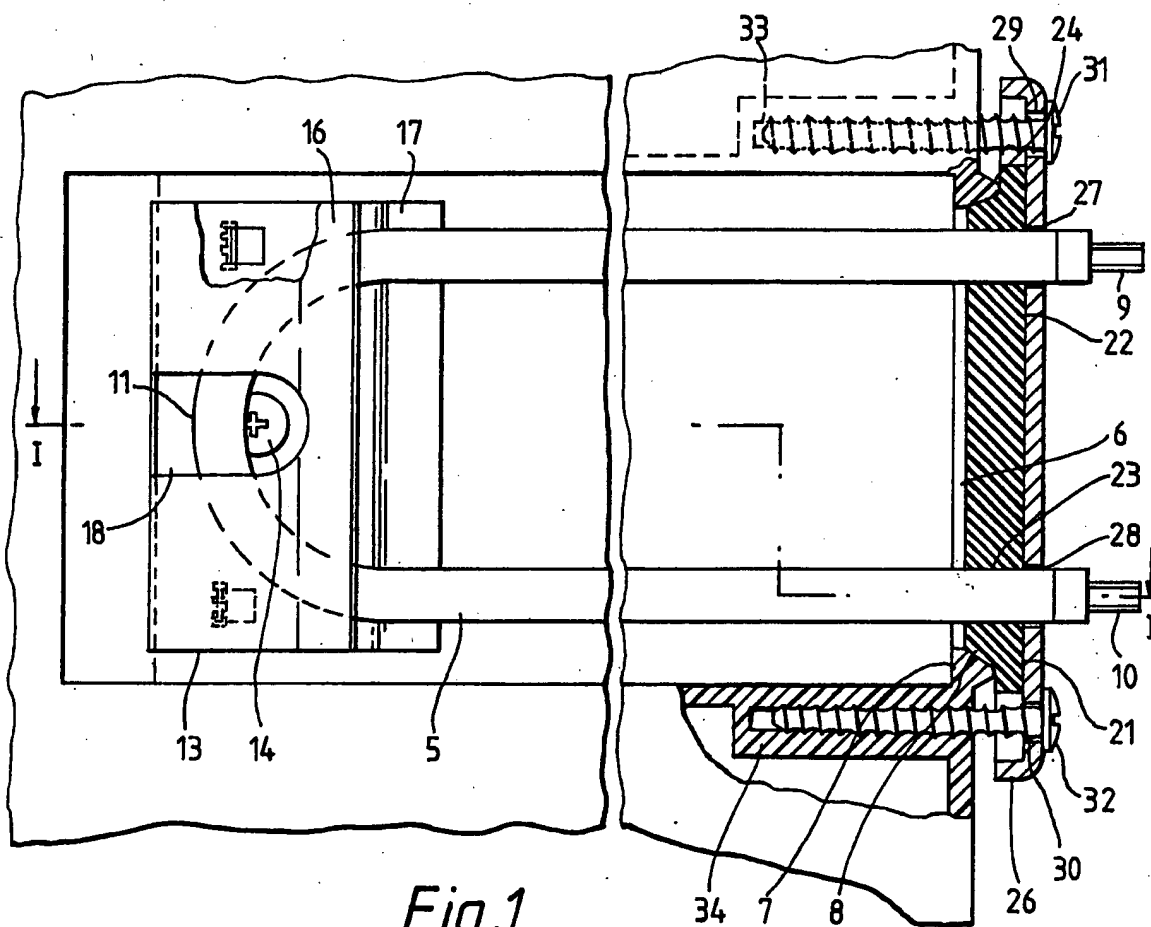


Fig. 1.

SPECIFICATION

Washing Machine Provided with Electrical Heating Element

The present invention relates to a washing machine such as a clothes washer or dishwasher and in particular to fixing the electrical heating element(s) in the tub of the machine.

It is known that, in relation to washing machines, the working fluid contained in the washing tub is normally heated by means of heating elements of the clad type, which are mounted within the tub and which are located in the lower part thereof.

The heating elements are introduced by way of the orifice of a housing in the tub, which is then sealingly closed from the outside by means of a fixing device which substantially comprises two metal flange members which are of rectangular shape and of different dimensions, being respectively inwardly and outwardly of the housing, the flange members being joined together by a clamping device acting on a seal of rubber or the like, of rectangular type, which is interposed between them. The clamping device comprises at least one screw which is secured by welding or soldering or rivetted to the internal flange member and which projects to the exterior sealingly through holes provided in the seal and in the external flange, in such a way that it can be engaged by the external clamping nut.

Tightening the external nut causes the flange members to move towards each other, whereby the flange members compress the seal unit until they cause lateral expansion thereof, in the regions of the seal which are not contained by the flange members, thereby sealingly to close off the orifice for introducing the heating element.

The two metal flange members and the interposed seal are also suitably perforated to permit the terminals of the heating elements to project sealingly to the exterior, for supplying electrical power to the heating element.

This form of the fixing device as described above suffers however from some disadvantages. Firstly, the seal remains permanently deformed even when the compressive effect of the flange members is removed, and it thereby prevents the fixing system and the body of the heating element from being removed from the tub, for maintenance and/or repair operations.

Another disadvantage which resides in this kind of fixing device lies in the use of expensive stainless material for forming the internal flange member which is in contact with the water contained in the tub, and the fact that the screw-threaded stud member which passes through the seal is joined to the internal flange by an undesirable operation of soldering or welding, or rivetting.

Another form of such a fixing device makes use of a single external flange, in which there are provided the seat means for clamping devices of the screw-and-nut type. In that case, the screw-threaded studs are soldered or welded in the

vicinity of the outside edge of the orifice for introducing the heating element into the housing, and they are capable of co-operating with external nuts for clamping the flange member, with the interposition of a seal. However, this arrangement also involves undesirable operations of welding or soldering the screw-threaded studs.

According to the present invention, there is provided a washing machine provided with at least one electrical heating element which can be introduced into a housing provided in the lower part of the tub through a front seal which is capable of bearing against a corresponding peripheral edge of an orifice of said housing and which can be clamped against said edge by means of an external flange member, by acting on fixing means, the front seal being of a shape which is tapered inwardly of the tub and said edge being correspondingly flared outwardly of the tub, and said fixing means comprising at least two self-tapping or self-threading screws capable of engaging into corresponding seat means provided laterally of said housing, resilient support means being provided within said housing for supporting the free end of said heating element and holding it at a spacing from the bottom of the housing.

As will be apparent from the following description, the present invention can overcome the above-mentioned disadvantages and provide a device for mounting the electrical heating elements in the tub of a washing machine, which does not require any soldering or welding operations, which is simple in construction and more convenient in use, and which readily permits the heating elements to be removed from the tub for any maintenance operations or replacement of the heating elements, that may be required.

The invention will be more fully described by way of non-limiting example of a preferred embodiment, with reference to the accompanying drawings in which:—

Figure 1 is a plan view in partial section of a heating element mounted in a clothes washing machine in accordance with the invention, and

Figure 2 shows a side view of the heating element of Figure 1 in section taken along line I—I.

Referring now to the drawings, diagrammatically shown therein is the lower part 3 of the tub of a clothes washing machine of conventional kind, in which there is provided an internal housing 4 adapted to contain at least one heating element 5 for heating the water in the tub.

The housing 4 is preferably produced integrally with the plastics tub of the machine, in a similar manner to the arrangement described in the present applicants' Italian Patent Application No. 45722 A/80 filed on 3rd July 1980.

The housing is provided with a front orifice 6 of rectangular shape, to permit the heating element 5 to be introduced into the housing. The orifice has a raised peripheral edge 7 having a flared

surface 8 whose diameter increases outwardly of the housing.

In turn, the heating element 5 is preferably of clad type and is provided with respective electrical terminals 9 and 10 adapted to be connected to respective conductors (not shown) of the electrical power source of the machine. The heating element 5 is fitted by first introducing it into the housing 4, and then fixing its first end 11, which is curved, relative to the bottom 12 of the housing.

This fixing is formed by using a resilient plate member 13 of rectangular shape, which is made of a material which is resistant to corrosion, for example stainless steel. The plate member 13 bears against the bottom 12 of the housing 4 and is secured in position there by means of a central screw 14. In turn, the plate member 13 is so shaped as to have a flat portion 15 in the region in which the plate member is secured to the bottom 12, and two portions 16 and 17 which are curved in opposite directions and which are spaced from each other by a sufficient distance to permit the heating element 5 to be introduced therebetween. The curved portion 16 which is disposed above the heating element 5 is provided with an aperture 18 which is of sufficient dimensions to permit a suitable tool to be introduced, for tightening or releasing the above-mentioned fixing screw 14.

The curved portion 17 which is disposed below the heating element 5 has a first upwardly bent section 19 and a second downwardly bent section 20, and bears with its free end against the bottom 12 of the housing 4.

The resilient plate member 13 of the above-described configuration is therefore capable both of supporting the heating element 5 and also holding it at a spacing from the bottom 12 of the housing.

A seal 21 of rubber or similar material is finally provided for sealing off the front orifice 6 of the housing 4 and is provided with two through holes 22 and 23 to permit the respective limb portions of the heating element 5 to pass therethrough.

The seal has a peripheral surface 24 which is of a shape which tapers inwardly of the housing, and is of dimensions which are slightly smaller than those of the orifice 6. The peripheral surface 24 is arranged to co-operate with the whole of the surface 8 of the peripheral edge 7.

The seal 21 is also provided with a projecting lip portion 25, the dimensions of which are larger than those of the front orifice 6 and which is capable of co-operating with the peripheral edge 7 at the front thereof.

Finally, a clamping flange member 26 is positioned over the seal 21. The flange member 26 has respective through holes 27 and 28 for insertion of the two limb portions of the heating element 5, and at least two further through holes 29 and 30 for receiving respective self-tapping or self-threading screws 31 and 32 which are adapted to engage into corresponding seat means

33 and 34 which are provided laterally of the housing 4.

For the purposes of hermetically closing the front orifice 6 of the housing 4, it is therefore necessary axially to compress the seal 21 in the orifice 6, by tightening the screws 31 and 32 into their respective seat means 33 and 34.

In this way, as soon as the lip portion 25 of the seal 21 comes to bear against the peripheral edge 7, it can no longer move axially, thereby producing a hermetic sealing effect in that region.

Consequently, the further pressure applied by the flange member 26 to the seal 21 causes radial expansion of the peripheral surface 24 of the seal, against the flared surface 8 of the peripheral edge 7.

In this way, a hermetic seal is also produced in that region, in respect of the seal 21 in the orifice 6.

In this way, the advantages achieved with the design according to the invention will be evident. In fact, in this case, the seal 21 does not remain permanently deformed as previously, since the seal can expand radially only to a limited extent, being restricted in its radial expansion by the provision of the peripheral edge 7.

Consequently, fitting or removing the seal to or from the orifice 6 of the housing 4 is facilitated.

In addition, it is no longer necessary to use the internal flange member and threaded studs, thereby eliminating the respective operations of welding or soldering, or riveting, of the prior art.

Finally, with the design according to the invention, it is also possible for the heating element 5 to be effectively supported within the housing 4 at a suitable distance from the bottom 12, by virtue of the provision of the resilient plate member 13 of the above-described configuration.

The invention may also be used in a dish-washing machine.

105 Claims

1. A washing machine provided with at least one electrical heating element which can be introduced into a housing provided in the lower part of the tub through a front seal which is capable of bearing against a corresponding peripheral edge of an orifice of said housing and which can be clamped against said edge by means of an external flange member, by acting on fixing means, the front seal being of a shape which is tapered inwardly of the tub and said edge being correspondingly flared outwardly of the tub, and said fixing means comprising at least two self-tapping or self-threading screws capable of engaging into corresponding seat means provided laterally of said housing, resilient support means being provided within said housing for supporting the free end of said heating element and holding it at a spacing from the bottom of the housing.

2. A washing machine according to claim 1, wherein said support means comprise at least one resilient plate member which is made of a corrosion-resistant material and which is provided

with a flat portion, which can be fixed by *per se*
known means against the bottom of said housing,
and two portions which are curved in opposite
directions and which are spaced from each other
5 by a sufficient distance to permit the free end of

said heating element to be introduced
therebetween.

3. A washing machine constructed and
arranged substantially as hereinbefore described
10 with reference to the accompanying drawings.

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